

Mk D&T

Claims:

1. Apparatus for applying torque to a first tubular relative to a second tubular, the apparatus comprising a first tong for gripping the first tubular and a second tong for gripping the second tubular,

wherein the first tong is provided with teeth around a peripheral surface thereof, the second tong is provided with at least one pinion, and the at least one pinion meshes with the teeth in such a way that the first tong and the second tong can be rotated relative to one another when the pinion is rotated.
2. Apparatus as claimed in claim 1, wherein the first tong is a back-up tong and the second tong is a wrenching tong.
3. Apparatus as claimed in claim 1, wherein the at least one pinion is located at or near the periphery of the second tong.
4. Apparatus as claimed in claim 1, wherein the first tong is substantially cylindrical.
5. Apparatus as claimed in claim 1, wherein the second tong is substantially cylindrical.
6. Apparatus as claimed in claim 1, wherein each of the first and second tongs have an axial passage extending therethrough for receiving a tubular.
7. Apparatus as claimed in claim 6, wherein a passage is provided from the edge to the axial passage of each of the first and second tongs to allow the introduction of a tubular into the axial passage of each of the first and second tongs.
8. Apparatus as claimed in claim 1, wherein a motor is provided on the second tong and coupled to the at least one pinion.

PATENT

Attorney Docket No.: WEAT/0214
Express Mail No.: EV041916732US

9. Apparatus as claimed in claim 1, wherein the second tong is provided with two pinions.

10. Apparatus as claimed in claim 9, wherein the pinions are located at or near the periphery of the second tong spaced by substantially 180° about the longitudinal axis of the tong.

11. Apparatus as claimed in claim 9, wherein the pinions are located at or near the periphery of the second tong spaced by substantially 120° about the longitudinal axis of the tong.

12. Apparatus as claimed in claim 1, wherein the second tong is provided with one pinion.

13. Apparatus as claimed in claim 1, wherein the first tong comprises a plurality of hydraulically driven clamping jaws for gripping the first tubular.

14. Apparatus as claimed in claim 1, wherein the second tong comprises a plurality of hydraulically driven clamping jaws for gripping the second tubular.

15. Apparatus as claimed in claim 13, wherein each jaw is equipped with two or more dies.

16. Apparatus as claimed in claim 13, wherein each jaw is attached to hydraulic driving means via a spherical bearing.

17. Apparatus as claimed in claim 13, wherein the first tong and second tong each comprise a plurality of hydraulic driving means, each hydraulic driving means comprising a piston rod and a piston chamber, and the jaw is an integral part of the hydraulic driving means, the dies being placed in pockets in the piston chamber.

PATENT

Attorney Docket No.: WEAT/0214
Express Mail No.: EV041916732US

18. Apparatus as claimed in claim 1, wherein bearings supported on resilient means are provided between the first tong and the second tong to support the first tong on top of the second tong.

19. Apparatus for applying torque to a first tubular relative to a second tubular, the apparatus comprising a gear and at least one pinion, and first clamping means for clamping the first tubular within the gear, the at least one pinion being attached to second clamping means for clamping the second tubular, and the at least one pinion meshing with the gear in such a way that the first clamping means and the second clamping means can be rotated relative to one another by rotating the at least one pinion.

20. Apparatus as claimed in claim 19, wherein the first clamping means comprises jaws mounted within the gear about an axial passage extending through the gear.

21. Apparatus as claimed in claim 19, wherein the second clamping means comprises jaws mounted within a clamping housing about an axial passage extending therethrough.

22. Apparatus as claimed in claim 21, further comprising a motor fixed to the clamping housing and coupled to the or each pinion.

23. Apparatus as claimed in any preceding claim for assembling downhole tubing.

24. A method of applying torque to a first tubular relative to a second tubular, the method comprising:

clamping the first tubular in a first tong;
clamping the second tubular in a second tong; and

internal use

PATENT

Attorney Docket No.: WEAT/0214
Express Mail No.: EV04/1916732US

rotating a pinion connected to the second tong and which meshes with teeth provided around a peripheral surface of the first tong so as to rotate the first tong relative to the second tong.

25. A method of applying torque to a first tubular relative to a second tubular, the method comprising: clamping the first tubular in a first tong; clamping the second tubular in a second tong; and rotating a pinion connected to the second tong and which meshes with teeth provided around a peripheral surface of the first tong so as to rotate the first tong relative to the second tong.

26. A method of coupling a tool to a length of tubular, the method comprising the steps of:

securing the tool in a basket;

lowering a tong arrangement having a rotary part and a stationary part, relative to the basket to engage respective locking members of the tong arrangement and the basket, thereby fixing the basket and the tool relative to the stationary part of the tong arrangement; and

rotating the length of tubular using the rotary part of the tong arrangement so as to couple the tool to the length of tubular.

27. Apparatus for enabling a tool to be secured to a length of drill pipe, the apparatus comprising:

a basket arranged to securely retain the tool;

a tong arrangement having a rotary portion and a stationary portion, the rotary portion being arranged in use to grip and rotate the length of tubular; and

first locking means provided on the basket and second locking means provided on the stationary portion of the tong arrangement, the first and second locking means being engageable with one another to fix the basket relative to the stationary portion of the tong arrangement.

28. Apparatus according to claim 27, wherein the first and second locking means are engageable and disengageable by means of linear movement of the tong arrangement relative to the basket.

29. Apparatus according to claim 27, wherein the basket is arranged to prevent rotation of the tool in the basket so that in use the rotary portion of the tong arrangement can be used to rotate the length of drill pipe to secure a screw connection between the length of drill pipe and the tool.

30. Apparatus according to claim 27, wherein one of the first and second locking means comprises one or more slots, and the other of the first and second locking means comprises one or more projecting members, the slots and the members being engageable and disengageable by relative linear movement of the tong arrangement and the basket.

31. A tong for use in clamping a length of tubular during the making up or breaking out of a connection, the tong comprising:

a body portion having a central opening therein for receiving a length of tubular; and

at least two clamping mechanisms mounted in said body, the clamping mechanisms being radially spaced about said opening;

a plurality of elongate mounting members disposed between each of the clamping mechanisms and the body of the tong, each mounting member having a flat face for abutting a side of a clamping mechanism and a rounded side for locating in a complimentary shaped recess in the tong body,

wherein each tong may be displaced to some extent from radial alignment with the central opening of the tong.

32. A positioning apparatus for a tubular in a tong, the apparatus comprising:

a base;

a movable member disposed on the base, the movable member having a first end contactable by the tubular to be positioned within the tong; and

- an indicator to indicate the position of the tubular within the tong.
33. The positioning apparatus of claim 32, further comprising one or more biasing members, wherein the one or more biasing members couple the axial member to the base.
34. The positioning apparatus of claim 33, wherein the visible locator comprises:
a housing having a first slot and a second slot;
a first indicator movably disposed on the first slot;
a second indicator movably disposed on the second slot; and
a cable coupling the first indicator to the movable member, wherein moving the movable member also moves the first indicator along the first slot.
35. The positioning apparatus of claim 34, wherein the cable is movable within a sleeve, the sleeve attached to the base at one end and the housing at another end.
36. The positioning apparatus of claim 35, wherein the axial member further comprises a contact member disposed at the first end.
37. The positioning apparatus of claim 35, wherein the axial member further comprises a rod for coupling the biasing members.
38. The positioning apparatus of claim 35, wherein the biasing members comprise springs.
39. A flange for use with a tong, comprising:
a top plate movably connected to a bottom plate;
one or more abutments disposed between the plates;
one or more force sensing members disposed proximate the one or more abutments, wherein rotating the top plate relative to the bottom plate moves some of the abutments closer together.

40. The flange of claim 39, wherein the flange comprises four wedges.
41. The flange of claim 40, wherein two wedges are attached to the top plate and two wedges are attached to the bottom plate.
42. The flange of claim 41, wherein each of the one or more cylinders is disposed between a wedge of the top plate and a wedge of the bottom plate.
43. The flange of claim 42, wherein each of the one or more cylinders comprises a piston at least partially disposed in the cylinder.
44. The flange of claim 43, wherein moving the one or more wedges closer together compresses the piston.
45. The flange of claim 44, wherein the piston further comprises a bearing disposed at a contact end.
46. The flange of claim 45, wherein at least one elongated slot is formed in the bottom plate for connection with the top plate.
47. The flange of claim 46, wherein the cylinder further comprises a second bearing.
48. A tong for providing a predetermined torque to a connection between a first tubular and a second tubular, the tong comprising:
at least two jaws, at least one of the jaws being movable inwardly towards the other to grasp the first tubular; and
an indexing assembly to determine a position of the first tubular relative to the jaws, the assembly including:
a first portion extending at least partially into an area defined by a vertical plane extending substantially between the jaws, the first portion retractable from the area upon contact with the first tubular; and

an indicator, the indicator showing the movement of the first portion and the movement of the first tubular.

49. The tong of claim 48, further comprising a torque measuring flange for measuring the torque applied to the tong, the flange comprising:

a top portion movably attached to a bottom portion;

one or more inserts disposed in the flange;

one or more cylinders disposed between the inserts, the one or more cylinders actuatable by the inserts.

50. The tong of claim 49, wherein the indexing assembly further comprises a mounting bracket.

51. The tong of claim 50, wherein the indexing assembly further comprises one or more biasing members coupling the first portion to the mounting bracket.

52. The tong of claim 51, wherein the flange further comprises:

two torque inserts attached to the top plate and two static inserts attached to the bottom plate.

53. The tong of claim 52, wherein the one or more cylinders include a piston.

54. The tong of claim 53, wherein rotating the top plate causes the two torque inserts to move closer to the two static inserts, thereby compressing the piston into the one or more cylinders.

55. A method for preventing damage to a tubular body when such tubular body is gripped and turned by a tong comprising:

supplying a tong having a tubular position indicator for indicating a position of the tubular body relative to the tong, and the tong having a torque flange mounted thereto for indicating a torque applied to the tubular body when the tubular body is turned by the tong;

PATENT

Attorney Docket No.: WEAT/0214
Express Mail No.: EV041916732US

indicating the position of the tubular body relative to the tong; and
indicating the torque applied to the tubular body when the tubular body is
turned by the tong.